

**Oil Sands Experts Group Workshop
Security and Prosperity Partnership of North America
Houston, Texas
January 24-25, 2006**

Oil Sands Workshop SPP Report

The Oil Sands Workshop SPP Report is based on the discussions at the Oil Sands Experts Group Workshop, held January 24-25, 2006 in Houston, Texas.

Copies of the *Workshop Working Report*, a detailed account of the workshop proceedings, are available by contacting either of the contacts below:

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For more information about the Security and Prosperity Partnership (SPP), reference can be made to the following websites: www.fac-aec.gc.ca/spp/spp-menu-en.asp or <http://www.spp.gov/>

For more information about the deliverables for the Oil Sands Experts Group, reference can be made to the *Annex, Report to the Leaders*:

<http://www.fac-aec.gc.ca/spp/spp-en.pdf> or
http://www.spp.gov/spp/report_to_leaders/prosperity_annex.pdf

January 31, 2006

Introduction

President Bush, Prime Minister Martin and President Fox officially announced the Security and Prosperity Partnership of North American (SPP) agreement in March 2005. The energy activities of the SPP encompass a trilateral effort among Mexico, the United States and Canada, to create a sustainable energy economy for North America. The Canadian oil sands are one of the world's largest hydrocarbon resources and will be a significant contributor to energy supply and security for the continent. As such, the three countries agreed to collaborate through the SPP on the sustainable development of the oil sands resources and an ad hoc Oil Sands Experts Group was formed that includes the U.S., Canadian and Alberta Government representatives.

The first deliverable for the Group consisted of the following: "By January 2006, building on joint discussions with key stakeholders and scientific experts, issue a report that discusses the mid- to long-term aspects of the oil sands product market development and the infrastructure and refinery implications for increased oil sands market penetration". To meet this deliverable, the Group convened a workshop in Houston, Texas, on January 24-25, 2006, that was jointly sponsored by the U.S. Department of Energy (USDOE) and Natural Resources Canada (NRCan). The Alberta Department of Energy, (ADOE) also participated in the workshop planning and delivery. Representatives from Mexico's Secretariat of Energy participated as observers. This report summarizes the results of the workshop discussions.

The goal of the workshop was: "To identify and develop options to address the infrastructure, market access and market capacity issues in North America associated with the value-added development in Canada of the oil sands". The workshop brought together experts representing the oil sands industry, refiners, marketers, pipeline companies, and government.

Delegates participated in the following working groups to examine the challenges associated with oil sands market development and propose potential actions:

- Upgrading & Refining
- Kicking the Natural Gas Habit
- Markets
- Pipeline Infrastructure

The most important challenges and proposed actions are summarized in the following sections.

Upgrading and Refining

The oil sands industry currently produces two types of product, synthetic crude and diluted bitumen.

Executive Summary: Oil Sands Experts Group Workshop, Houston, January, 2006

The highest value products are sweet synthetic crudes (SCO) characterized by zero residue and low sulphur. However, while SCO commands a premium price and is in many ways comparable to light sweet crude, the high aromaticity of bitumen from which it is derived limits its penetration into refineries that are not specially equipped to handle it. A typical refinery is limited to between 10-20% of SCO in its crude slate. Part of the solution lies in additional technical/infrastructure capability in existing or new refineries and another lies in producing a higher quality light sweet synthetic crude, something being planned by a few of the new oil sands projects.

Unprocessed bitumen is also marketed, but for pipeline transportation reasons must be shipped in diluted form. It sells at a considerable discount to synthetic crude as can be explained by the light-heavy differential: because heavy oil is worth less to a refiner, it typically sells at a discount to light oil. This difference in price is referred to as the differential. When the differential widens, it means that heavy oil is trading at a larger discount to light oil and it fetches a lower price. Bitumen is discounted yet again with respect to heavy oil.

The low price, or netback, that the bitumen producer currently receives is due not only to the fact that there is a ready supply of this less valuable commodity, but also to the high cost of diluent. In fact, after accounting for the costs of diluent (condensate or synthetic crude), operations, transportation, and capital recovery, the netback for dilbit, syn-bit, and syn-dil-bit¹ producers is greatly reduced and often in the single digits, despite a high price for light sweet crude oil.

Upgraders or refineries with upgrading capability are able to capture value using bitumen as a feedstock, which is why a sustained and sufficiently large differential will, in time, prompt more upgrading in Canada. Both the Canadian and Alberta governments would like to see more value-added activities in Canada. For Alberta, this potentially means more upgrading to synthetic crudes, as well as more refined petroleum products, including specification transportation fuels and petrochemicals. Such investments could help to address the refining capacity shortage in the U.S.

The working groups also discussed the possible use of other refining centres, including Mexico, to help extract value from the oil sands resource.

Potential Actions:

It is the responsibility of the producers and upgraders to continue the dialogue with future refinery markets in the U.S. to ensure a broad understanding of the oil sands industry.

In the short to medium term, continued bitumen supply may require commercial deals between producers and refiners that more equitably share the risks and benefits. In the longer term, there may need to be a more stable, open pricing mechanism for diluted blends.

¹ **dilbit** = 20-30% condensate + bitumen; **syn-bit** = 50% synthetic crude + bitumen; **syn-dil-bit** = condensate + synthetic crude + bitumen

Executive Summary: Oil Sands Experts Group Workshop, Houston, January, 2006

Government needs to be informed and ensure the flow of information amongst themselves and the various stakeholders. One example of this is the work being done for the Alberta government and industry through the Hydrocarbon Upgrading Task Force to develop a long-term business case for more upgrading and value added products in Alberta.

Kicking the Natural Gas Habit

Discussion of the energy sources used in recovery and upgrading are not directly related to expanding the market opportunities for oil sands products. However, there are indirect relationships in terms of the overall economics, and in facilitating the production of higher quality synthetic crudes. There are also links to the third SPP deliverable for the Oil Sands Experts Group, examining the long-term prospects for enhanced oil recovery in Canada and the U.S. using CO₂ from oil sands operations.

Both production and upgrading of oil sands bitumen require significant energy inputs which are largely met by natural gas today. Such dependence on natural gas is believed to be unsustainable as the industry expands. Energy sources such as coal, nuclear, and internally generated residues or upgrader by-product coke have been suggested and some reviewed as alternatives. Some commercial projects are already responding to the challenge of “kicking the natural gas habit” by the use of processing schemes that replace natural gas with their own internal residues. In fact, such processing schemes create a special advantage. Firstly, the residues, or the least valuable and heaviest portion of the bitumen, are consumed. Secondly, the remaining lighter portions are more easily upgraded. Thirdly, using such schemes ultimately provides more options for the operator to produce higher quality synthetics.

A key enabling technology in these processing schemes is gasification. However, while gasification is well established in some refineries and power production worldwide, there may be special challenges in adapting it for wide scale use in oil sands. As such, it needs to be further studied, and demonstration scale prototypes may be required to advance the development of technology.

In addition, using coal or residues to replace natural gas results in a higher CO₂ emission intensity. Participants discussed the need to investigate the capture and distribution of CO₂ to other users, such as enhanced oil recovery projects, as well as the long term need to provide for hydrogen and CO₂ pipeline networks to connect to key industry hubs and potential users.

Potential Actions

The Canadian and Alberta governments need to confirm the likely position on future natural gas supplies, and develop an understanding with industry on future expectations regarding energy for oil sands development. The Oil Sands and Natural Gas Expert Groups under the SPP will continue to exchange information on this issue.

Executive Summary: Oil Sands Experts Group Workshop, Houston, January, 2006

Governments and industry have a mutual interest to assess alternatives to using natural gas in oil sands operations. In addition, they have a strong vested interest in demonstrating the viability of gasification for residues and coal. Consideration should be given to tailored incentive programs and/or part funding of studies and demonstration-scale technologies.

In the opinion of many workshop participants, a study of CO₂ emissions and associated infrastructure, currently scheduled under the SPP for review in 2007, should be considered for more immediate action.

Markets for Oil Sands Products.

The key market issues largely concern increasing and diversifying the market; evaluating the impact of products in the marketplace; understanding the entire value chain; and determining what exactly would be involved in refining bitumen to transportation fuels.

Canadian and U.S. refiners are the preferred markets for oil sands derived products. However, as already mentioned in the section on Upgrading and Refining, given current refinery configurations and capacity, there is a limit to the amount of synthetic crude and bitumen that the market can absorb. If oil sands production is to realize its full potential, new markets must be developed in the U.S. and possibly offshore, via the west coast.

Not only must new markets be created, but also the impact of products in the marketplace must be considered. Is the current marketing model sustainable for the future? Oil sands producers and U.S. refiners have made considerable progress in a common understanding of the characteristics of individual synthetics. However, as more “unique” products emerge (from new projects) there is a danger of creating confusion in the marketplace. In addition, pipelines will be asked to handle an increasing number of individual crudes with associated batching problems.

Finally, there is a need to understand the entire value chain and determine what exactly would be involved in refining to transportation fuels. What is the long-term view for such fuels in North America? The current strategy of re-configuration and refinery creep is insufficient to respond to demand for transportation fuels. New build will be required. Furthermore, the U.S. leadership in fuel emissions regulations has led to more technically demanding fuel chemistry or “boutique fuels” and more complex refineries. Internal combustion engine research is also underway which has the potential to transform engine technology.

Potential Actions

It will be necessary to look at options and plan for a smooth transition towards bitumen production that could be as high as 5 million barrels per day as was envisioned by the Oil Sands Technology Roadmap. A better understanding is needed of the future mix of unprocessed diluted bitumen, synthetic crudes, finished products and petrochemical feedstocks to meet optimum value-added potential. In addition, producers and refiners need to ensure that refinery capacity is available and that the risks of constructing and

Executive Summary: Oil Sands Experts Group Workshop, Houston, January, 2006

operating facilities can be shared. Producers could consider pooling production into a few market crudes in consultation with major market regions.

The US and Canadian federal governments may need to be involved in ensuring that refinery capacity is adequate and that future fuel specifications and trends are well understood. A structural and incremental approach to fuel specification changes would help to ease the burden on refineries from having to constantly tweak their operations to meet ever changing specifications. In the long-term, governments and industry may need to work towards developing stable, standardized sets of specifications for high quality, clean fuels to provide greater flexibility and certainty to the market.

Addressing the issue of transportation fuels and further study of fuels quality in relation to oil sands products is the second SPP deliverable for the Oil Sands Experts Group.

Pipeline Infrastructure

The geography of North America requires integrated long distance pipelines that transport crudes and finished products. New pipelines and pipeline expansion plans are already in place to meet the certain doubling of oil sands production to two million barrels per day by 2010 to 2012 timeframe. This includes extensions of the market via a west coast port, and more deeply into the U.S. However, pursuing new markets beyond then will necessitate an expansion in delivery systems. The fivefold expansion anticipated for oil sands products in a relatively short time span will represent many challenges for the pipeline industry. New and expanded pipelines will move more volume into existing and expanding interior U.S. markets, and offer shipments to California via the Canadian West Coast.

The workshop addressed the major pipeline issues including the size of the investment, permitting, and handling an increasing variety of products.

There are risks with pipeline investment decisions, particularly as they relate to determining pipeline capacity, and who should bear the cost in the event of temporary excess capacity.

Regulatory and permitting issues were cited as a concern on both sides of the Canada/U.S. border, as they impact the overall risk and timing of pipeline investments. In the United States, pipeline companies face an often complicated and “patchwork” collection of local, state, or federal regulations as well as potential obligations to Native American groups.

The Canadian and US Governments already cooperate and share information with respect to pipeline regulation.

As many new synthetic crude variants come on to the market, pipelines will be required to handle increasing numbers of separate batches. While this is technically feasible, this does place certain operational constraints on the system. Fewer product types in the

Executive Summary: Oil Sands Experts Group Workshop, Houston, January, 2006

medium to long term may help to reduce these constraints as could basic research and development in new ways to ship bitumen.

Potential Actions

Ultimately, the market will determine the investment decisions related to pipeline build and capacity. Timely information on oil sands projects, start up dates and expansion plans are key to coordinated construction of pipelines.

Governments are encouraged to streamline the regulatory approval process and better manage the risk to both pipeline and energy projects. Canadian governments have already gone a long way to coordinating and streamlining the environmental and regulatory approvals, but more needs to be done.

Providing process mapping and a one-stop-shop for projects would help to ease the complexity, facilitate coordination and reduce the time required for regulatory approval and permitting.

The Labour and Infrastructure Challenges

Although they were not a separate topic of discussion during the workshop, labour issues and infrastructure challenges in North America were raised in each of the four working groups. The rapid pace of development in Alberta and in other parts of North America has contributed to escalating demands for in skilled trades people and professional engineers that have placed pressure on their availability as well as the cost of their services. These pressures could affect development plans and time lines for oil sands projects, pipelines, upgraders and refineries. Construction materials also face similar pressures. Several of the groups also discussed the infrastructure limitations in the fast growing region of Fort McMurray.

Potential Actions

This issue is being addressed at the federal and provincial levels of the Canadian government, and by professional organizations in their respective areas of jurisdiction. Efforts are on going.

Conclusion

While there are significant challenges in the long-term expansion and market acceptance of oil sands products, industry and governments have a vested interest to work together to ensure the successful expansion of this important North American energy resource. All market challenges associated with this expansion can be successfully addressed so that the oil sands can make a truly significant contribution to North America's energy supply and security.